THE AMERICAN JOURNAL
OF
OPHTHALMOLOGY.

VOL. XXIII. MAY, 1906. No. 5.

ORIGINAL ARTICLES.

DISCUSSION OF DR. ALLEMAN'S PAPER.*

Dr. Jackson (Denver): It seems to me that Dr. Alleman has brought to us, in the effectiveness of military organization, an excellent illustration. He insists that in order to attain success we must have mutual confidence in each other. It was the lack of that confidence more than any other one thing that was illustrated in Dr. Spalding's paper. The latter shows us things as they are, and Dr. Alleman shows us why they are so. The mutual confidence and ability to act together is not founded on the fact that every man in the army is exactly like all the others, and that each will do exactly the same thing, and strike at the same point. It is founded on the fact that each man believes that every other man will do his duty. It often lies in another direction, but he will do his duty. Mutual confidence in the medical profession will only come when we realize something of that same fact; when the practitioner of internal medicine knows the oculist knows ophthalmology as the former knows internal medicine. That confidence is not bred by an undergraduate course which trains the whole body of students for internal medicine; it would not be bred by a course that trained them all for ophthalmologists. The undergraduate course in medicine must give all a firm common foundation, and also start them in the special direction they intend to go. An undergraduate medical school does not train men as ophthalmologists. One does not need to cite 500 hours of internal medicine, and 100 of ophthalmology to show this. The whole medical course must be reorganized to meet new conditions. There was a time when all were general practitioners.

*See April number of this journal.

Now we might be designated as general practitioners and specialists. But there will come a time when all will be specialists, where the population is condensed enough. It will not be a generation until it is generally recognized that medicine is a group of specialties, and the medical education that will prepare men for their work will be the education that fits them to be specialists in one direction or another. If medical education is to consist of 500 hours of medicine and 100 hours of ophthalmology, the latter will be taught outside of medical schools, and the probability is it will be separated from medical practice. Either better schools will spring up than the present cheap opticians' schools, or something else that is not now in sight will develop to train men in ophthalmology. I believe what I urged last year is the best solution of the problem.

Dr. Baker (Cleveland): I read a paper some years ago at the Saratoga meeting of the A. M. A. on the same subject. I called attention to the mistake of confusing the medical student of today with the student of former times. I recall ten or fifteen years ago having had students under my instruction for two or three months, whom I am satisfied never saw an optic disc. At the present time we have youths entering medical colleges already educated in physics, biology and chemistry, and when they come to us they have spent two or three additional years in laboratory work and the use of the microscope. They have trained eyes and ears and hands and minds, such as Dr. Alleman and I never knew when we were medical students. I have seen these trained men the first time an ophthalmoscope was put in their hands sit down and make a creditable drawing of the fundus. When you say these men cannot use the ophthalmoscope to some advantage in their future life, I do not believe it. These men can and should be taught the use of the ophthalmoscope. If you show a case of retinitis albumenurica to that man he will remember it all his life. If through lack of practice or experience he does not have confidence in his own skill to make such examinations, he will at least know enough to send the patient where he can get such services.

Dr. Alleman (closing discussion): As I have said, we have got to consider the average, not the brainy, student; and I ask you, is not the average man apt to mistake opaque nerve fibres (for example) for albuminuric retinitis? That retinal changes are due to systemic disease he ought to know, and if he does he will obtain the aid of an expert to assist him in making a diagnosis of the general condition. Personally, I would not attempt to make a diagnosis of a neoplasm by the microscope. I would not take out an eye on my own diagnosis, even if I could recognize the different neoplasms with reasonable certainty. I would call in an expert. I think the ophthalmoscope should be used only by the man who has the greatest opportunity to become expert in its use. The average man does not want to know all the specialties.

NOTE ON THE MEASUREMENT OF TORSION.*

By LUCIEN HOWE, M.D.

BUFFALO.

It is well known that in the act of comfortable binocular vision at the near point there are three principal factors which enter into the problem. These are accommodation, convergence and torsion. In our ordinary clinical work we are accustomed to examine with a certain degree of care, at least, the manner in which accommodation and convergence take place in the individual before us. There are few practitioners, however, who give much attention to the torsion which the globe undergoes. Moreover, a very considerable number of ophthalmologists seem to know nothing about torsion, and care less concerning it. It is probable, however, that this movement, which every normal eye undergoes, is also of some clinical importance. It seems worth while, therefore, to ask ourselves how this can be measured.

The first measurements were made by an instrument suggested by Hering, or by some modification of it. That can be found in the older text books, for example, in the first edition of Graefe's Saemisch, Volume VI, page 661. Donders used an arrangement which he called an isoscope. A description and figure of it can be found in Graefe's Archives, Volume XV, page 1. A rather more recent method of measuring torsion was suggested by Le Conte, and is found in his book on "Sight," although his more elaborate article is in the *American Journal of Science and Art,* second series, page 453. The instrument to which I would call attention is based on a principle somewhat similar to that of Le Conte's. His plan was to draw a series of parallel vertical lines, placing these on a card before one eye. Another series of similar parallel vertical lines was placed before the other eye. Then, tipping the cards with the lines at a certain angle, and at the same time making convergence to a given point between the eyes and the cards, he would ascertain at what angle it was necessary to tip these cards, in order to make the lines appear vertical. The angle which the two cards then make with each other, evidently represents the amount which the vertical axes of the two eyes have actually tipped away from the vertical position.

As the plan adopted by Le Conte was tedious, it was found convenient to prepare a mechanical arrangement with which to assist

*Read at the tenth annual meeting of the American Academy of Ophthalmology and Oto-Laryngology, Buffalo, Sept. 14th to 16th, 1905.

in this, and by which the angle could be measured more exactly. It was this arrangement of the lines on the cards which the writer designed to demonstrate. The description of this is almost meaningless, without proper illustration. Those who are interested in the subject will find it described in detail in the first volume of a work on the "Ocular Muscles," now in press by Putnam's Sons.

Briefly stated, it is as follows: On a white card which measures about fifteen centimetres square, black vertical lines are drawn. On another card the same size, but of black paper, white vertical lines are drawn the same distance from each other as are the black lines on the white card. These two cards are attached to the lower side of a thin band of steel, and this band is fixed to a horizontal bar in such a way that when the band of steel is relaxed the lines on the two cards are then perfectly vertical. But when the steel band is bent, the two cards and the lines are inclined upward, making an angle below like the letter A. The angle which these cards include, show the amount of convergence which the eye undergoes. This description is evidently unsatisfactory, and especially so without a table showing what the normal amount of torsion is, with each meter angle of convergence in the horizontal plane, and in planes which lie above or below the horizontal. The discussion of that question, however, is foreign to this description. This is simply to call attention to the fact that it is impossible to measure torsion with a very simple mechanical device. That, and other means for measuring it, and also the amount of torsion which the eye undergoes under various conditions, are described in the first volume of the work on the muscles just referred to.

DISCUSSION.

Dr. Valk (New York): I have been very much interested in Dr. Howe's demonstration, and shall be glad to read his paper. At the same time, I cannot help asking myself the question, What of it? I am not satisfied with the importance of this condition, and I hope Dr. Howe will bring it out. You are all familiar with what torsion is, and the question comes up, how much influence has it on the daily walk of life. It is a very beautiful subject, scientifically, and I like some times to lie in bed and try to study the after images of the retina in the morning, in reference to the tipping in the periphery of the field. Dr. Howe has brought out the point that in investigating cyclophoria to always have the figures at right angles to the line of sight. Another point that comes up is the fusion force of the eye in regard to vertical lines. I trust he will explain this matter to me, as we bring about fusion and binocular vision by divergence. If you take two almost vertical lines, or lines slightly inclined toward each other, say 5 degrees, and look at them in this way (illustrating) until you get the peri-

scopic effect, it is found that the lines in the stereoscopic picture are perfectly parallel and vertical. There seems to be some power in the retina to fuse or blend these vertical lines, without the images being on exactly corresponding parts. It seems to be a psychological phenomenon, and I know of no other way to explain it. The fact of there being such a condition as cyclophoria I doubt. We may have a cyclotropia as a patholigical condition. If we have a paralysis of the superior oblique, that will give a tipping of one image, but I do not believe in the theory of cyclophoria, unless you have a paresis. I saw a case the other day in which such a diagnosis had been made, and in examination with the tropometer it was proved to be a paralysis of the third nerve. As I said, I have no experience with this condition of cyclophoria. I have never come across a case, but Stevens is working along the same line, and he thinks now that the condition of heterophoria is due to cyclophoria. I have tried over and over again, with one test and others, and yet I have seen no cases of cyclophoria. I think there is a physiological function which entirely corrects the position of vertical meridians, unless there is a paralysis of the superior or the inferior oblique. Yet if I uphold my anatomical theory, if we can have a muscle too strong or too weak, then I can see no reason why a superior oblique may be too weak, and in this way it should produce a cyclophoria. I trust that when I have the pleasure and profit of reading Dr. Howe's paper I shall be convinced of the error of my ways.

Dr. Howe (closing): What I was speaking of was the tipping, which the axes made. The doctor asks what is the use of these tests. I will mention simply one. When we ask the patient to look at the dial for correction of astigmatism, that dial is in the distance, and we correct the astigmatism with the axes vertically adjusted for the distance. When the patient looks at a near point the vertical axis will be wrong. For the higher degrees of convergence it does make a difference, whether or not torsion is taken into account.

REPORT OF A CASE OF DIABETIC MYOPIA.*

BY JOHN E. WEEKS, M. D.,

NEW YORK.

The report of the following case is of interest because of its rarity.

The patient, Dr. John H. S., aged 52 years, consulted me on October 3, 1901, regarding his refraction. At that time the refraction was

R. +0.125
L. +0.25⌒—0.5 axis 10°

*Read at the 10th annual meeting of the American Academy of Ophthalmology and Oto-Laryngology, Buffalo, Sept. 14th to 16th, 1905.

The refraction remained virtually the same until January 1, 1905, when the patient observed that objects at a distance were somewhat blurred, and it became necessary for him to hold his book closer to the eyes than had been the case previously.

The patient was suffering from a chronic affection of the face of a specific nature, which had recently taken on activity, and this, accompanied by other troubles, had caused him excessive worriment. About the first of January he noticed that the amount of urine voided was large in amount, but paid no particular attention to it.

The vision gradually became less acute for distance until on February 5 he was scarcely able to recognize the features of acquaintances beyond 10 or 12 feet. The polyuria had also increased. On measuring the quantity of urine, it was found that he was passing from 134 to 150 ounces in twenty-four hours, and that the percentage of glucose was 2.7, about 3.75 ounces (112.5 grams).

The patient came to me on February 18, because of the increased dimness of vision for distance. At this time the refraction was

R. —0.62⊖—0.5 axis 90°
L. —0.5 ⊖—0.75 axis 40°

With this correction the vision was $^{20}/_{20}$ in each eye. Glasses were prescribed after the above formula. The presbyopia, which was 2.5 D., had not increased. There was no appreciable change in the interior of the eyes.

On February 16 the patient began a rigid diet and commenced taking half a grain of codeia every three hours.

On February 23, four days after the glasses prescribed had been obtained, the patient returned to the office with the statement that his glasses for close work were not quite strong enough.

On February 26 the patient stated that his sight for distance had returned, and that he was no longer in need of the glasses for distance vision. The refraction at this time was

R. +0.25⊖+0.25 axis 5° V.=$^{20}/_{20}$
L. +0.5 axis 145° V.=$^{20}/_{20}$

On February 26 the amount of urine voided in twenty-four hours was 52 ounces, and the percentage of glucose was 3.5, about 1.8 ounces (54.6 grams).

March 10. Patient still dieting; amount of urine voided in twenty-four hours, 48 to 50 ounces; the amount of glucose not enough to determine percentage. The refraction remained hyperopic.

June 25. Patient is in good health; little or no gylcosuria. The refraction is as when the eyes were last examined.

The case is one of rapidly-acquired myopia, affecting both eyes. The degree of myopia developed was approximately one and a quarter dioptres in each eye, and the astigmatism was increased one-fourth dioptre, with slight change of axis.

The time that elapsed from the onset to the complete disappearance of the myopia was about two months.

Hirschberg (*Centralbl. f. Aug.*, 1886 and 1891) reports three cases, occurring in patients 63, 52 and 50 years of age. All had acquired myopia rapidly and all had good vision with the correction.

Cases are reported by Appenzeller (*Centralbl. f. p. Augen.*, XX., 1896, p. 139).

In Grimsdale's case (*Brit. Med. Jour.*, Feb. 4, 1890) the myopia developed was two dioptres; it disappeared in ten days.

Risley (*Trans. Amer. Ophth. Soc.*, 1897, p. 121) reports two cases. In the first case the lessening of the hypermetropia (increase in the refraction of the eye) apparently reached 3.75 D. in one eye and 4.5 D. in the other. No recession in the myopia was observed. In the second case a greater degree of hypermetropia was developed in a diabetic patient of 74 years during a period of recession in the amount of sugar excreted in the urine, and the former degree of hypermetropia was re-established on return to the former amount of sugar excreted.

Other disturbances of refraction occur. Horner (*Klin. Monats. f. Augen.*, 1873, p. 490) reports a case of acquired hypermetropia in a patient of 53 years. Treatment of the diabetes reduced the hypermetropia by two dioptres. This case appears to be unique. It is difficult to account for the development of hypermetropia in diabetes mellitus. All of the conditions make for an increase rather than a decrease in the refractive index of the media of the eye.

Schmidt-Rimpler (*Graefe-Saemisch Handbuch*, Bd. XI., T. 1, p. 388) examined the range of accommodation in 80 diabetics and found 14 per cent with diminished range of accommodation. The effect on the range of accommodation varied from one dioptre to nine dioptres, the last in a person of 16 years.

All writers are agreed that the increase in the refraction of the eye is due to an increase in the index of refraction of the lens as a result of the presence of sugar in the fluids of the eye.

DISCUSSION.

Dr. Jackson (Denver): Cases such as Dr. Weeks has reported are so rare that I think none of us can draw conclusions from individual experience, and perhaps we are not yet in a position to draw conclusions from all the collected cases. Dr. Weeks' explanation is a good one, and applies to cases where increase in myopia is clearly coincident with increase in the amount of sugar in the urine and increase in the discharge of urine; and yet that these conditions are directly connected has not been demonstrated in any of these cases. It is merely a probability—a supposition—and in the light of Horner's case and one I put on record now, there must also be some other explanation.

Mrs. B., aged 52, came with a history of diabetes lasting several years. Recently the amount of sugar had been largely increased and her general condition was worse. Until a few weeks before distant vision had been good, and there had been no trouble other than normal presbyopia. Then her vision went down to $^4/_{60}$. She complained of polyopia, saw three moons, and the electric lights appeared broken up, some of the lights being red. With R. & L. plus 2.25 sph. vision of $^4/_4$ was obtained. These lenses were prescribed for distance, and for near work she was given R. & L. plus 4.25 sph. For a little time they served her very well. Three months later she returned, complaining that she could not see with the distance glasses, and could not use the near glasses for reading. Vision without any glasses was now $^4/_4$ plus. The same was obtained with R. plus 0.50; L. plus 0.62. She was given R. & L. plus 2.75 sph. for near work only. Six weeks later she was using these satisfactorily, and her eyes were unchanged in refraction. Her general condition rapidly grew worse and she died within a few months, without any other marked change in refraction. I would say that a satisfactory explanation of these sudden changes in refraction in diabetic patients has not yet been made.

Dr. Weeks (closing discussion): I am much indebted to Dr. Jackson for the presentation of this case, and would like to ask him if the amount of sugar in the urine diminished at all during the period that he observed the patient?

Dr. Jackson: Not materially. The amount of sugar was never very great, according to my recollection—3 to 5 per cent—varying from day to day, or week to week all the time. The patient grew worse just before the hyperopia appeared. The tension of the anterior chamber was normal throughout.

Dr. Weeks: It is possible that some other cause was at work to produce the condition of the eyes in this case.

THE MECHANISM OF ACCOMMODATION AND ASTIGMATIC ACCOMMODATION.*

BY EDWARD JACKSON, M. D.,

DENVER.

Porterfield[1], one hundred and fifty years ago, wrote thus in the opening of his chapter on "The Crystalline Humor": "From its solidity and transparency the ancients concluded that it was nothing but a thick, congealed humor. But though it be commonly called a humor, it is really made up of solid parts." Then he goes on to describe the "many thin spherical laminæ, or plates lying within each other," and the fibres composing these, which had recently been described by Leeuwenhoek.

Cramer[2], Helmholtz[3] and Knapp[4], occupied with proving that the lens changed its shape during accommodation; that the change was such as would produce increased refraction; and that the extent of the change in the lens surfaces corresponded to the amount of the accommodation, apparently gave little attention to the exact mechanical factors upon which this alteration of form depended. Helmholtz suggested a plausible explanation might be found in the tendency of a uniform elastic bag containing fluid, to assume a spherical form when released from external pressure. When the zonule was relaxed the lens might become more nearly globular. Such a possible change has been largely accepted as an established fact, or at least as an essential portion of the Helmholtz theory, which regards accommodation as produced by relaxation of the zonule.

The fact pointed out by Porterfield that the lens is not a humor, but, "is really made up of solid parts," had been so lost sight of that Tscherning[5], in clearing the ground for his own theory of accommodation, having demonstrated "that accommodation is effected by the temporary formation of an anterior lenticonus," goes on to say, "the hypothesis of Helmholtz does not seem tenable; for it is not easy to conceive how such a mechanism could produce a flattening of certain parts of the crystalline lens and at the same time an increase of curvature of the other parts." Priestley Smith,[6] however, has pointed out that the lens might easily be so constructed that the changes of form during accommodation observed by Tscherning, would take place during relaxation of the zonule.

---

*Read at the 10th annual meeting of the American Academy of Ophthalmology and Oto-Laryngology, Buffalo, Sept. 14th to 16th, 1905.

I believe that the evidence we now possess on the subject indicates that the changes in the form of the crystalline lens during accommodation depend upon the peculiar structure of the lens, rather than upon any peculiar sort of stress to which the lens is subjected through the zonule.

An elastic capsule containing fluid may assume different forms, dependent upon the degree of tension applied to it, and the direction or manner of its application. Its form will depend not at all upon the fluid contained, but upon the qualities of the capsule and the stress to which it is subjected. On the other hand, an elastic substance, such as the lens is, will change in form under any stress put upon it, but with the release from stress will tend to return to the special form determined by its own peculiar structure.

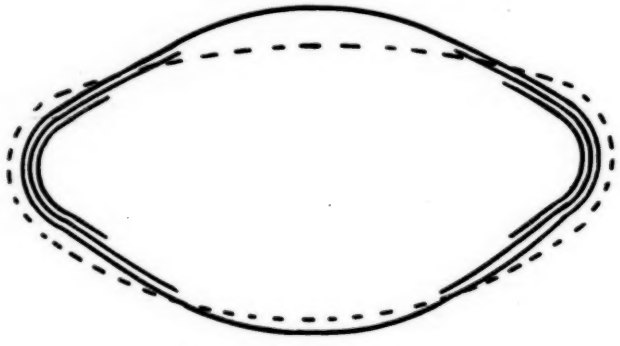

FIG. 1.

Priestley Smith[6] closely imitated the change of outline observed by Tscherning, by using concentric springs of steel. A modification of his arrangement, conforming to the lens changes observed during accommodation by Grossman[7], is represented in Fig. 1. Under stress by traction in the direction of the zonule, the outline becomes that shown by the broken lines, similar to that of the lens with the accommodation in abeyance. But upon relief from the stress, the form assumed is rather that of the solid lines. Think of the innumerable forms of metal spring, or of India rubber articles with which we are familiar. Under stress any of these things will change its form; but upon being relieved from outside tension or pressure, it immediately resumes the form determined by its original constitution and structure. That Tscherning found it hard to conceive how lenticonus should develop under relaxation of the zonule, shows that he lost sight of

the fact that the lens is really an elastic body, tending to assume a shape of its own, that he thought of it as entirely passive, under influences exerted on it from without. Remembering, then, the character of the lens, no outside stress whatever is necessary to account for any possible shape that it may take during accommodation.

As to the general changes in the form of the lens during accommodation, there is now little room for doubt. The measurements of images formed by reflection from the anterior surface of the lens, that have been made by Tscherning and his pupils, and by others, conclusively demonstrate the formation of anterior lenticonus during accommodation. Grossman, in his favorable case, has demonstrated that increased conicity of the posterior lens surface also occurs. These changes perfectly explain the greater increase of refraction at the center of the pupil, as compared with the margin; which had been observed subjectively by Thomas Young[8], and others who have repeated his experiments, and which are fully confirmed and shown to be generally true by study of the changes produced by accommodation in the skiascopic play of light and shadow. It is thoroughly established that during accommodation the increase of refraction is greatest at the centre of the pupil; although in the great majority of eyes, some increase is shown in all parts of the pupillary area.

What the changes of refraction in the different parts of the pupil usually are, I have tried to ascertain by skiascopy, by comparing the aberration exhibited in the pupil as studied by skiascopy without the use of a cycloplegic; first, with the accommodation relaxed by the use of convex lens; and, second, with the accommodation exerted to see clearly a small object held close before the eyes. In the former case the aberration was usually positive; in the latter it was usually negative. The accompanying table summarizes the observations made in 36 cases.

In the table the second column indicates the sex, the third the age of the patient. The fourth shows the increased refraction at the center of the pupil to see clearly the object fixed; that is, the amount of accommodation exerted. When this accommodation was exerted, however, the refraction at the edge of the pupil had only increased by the amount shown in the fifth column; the difference between the center of the pupil and edge being given in the sixth column, headed deficiency of accommodation at edge of pupil.

TABLE.

	Sex	Age	A. at centre	A. at edge	Deficiency
1.	F.	11	5	3.75	1.25
2.	F.	11	4	3.50	0.50
3.	F.	14	7	4.	3.25
4.	M.	15	5	3.50	1.50
5.	F.	17	3	2.	1.
6.	F.	18	4	2.50	1.50
7.	F.	18	5	3.50	1.50
8.	F.	20	3	1.75	1.25
9.	F.	21	4	1.50	2.50
10.	F.	21	3	2.	1.
11.	M.	22	3	1.75	1.25
12.	M.	23	3	1.75	1.25
13.	M.	23	3	2.75	0.75
14.	F.	24	3	2.50	0.50
15.	M.	25	5	3.25	1.75
16.	F.	26	5	4.25	0.75
17.	F.	26	5	4.25	0.75
18.	F.	28	5	3.75	1.25
19.	M.	28	3	2.	1.
20.	F.	28	4	3.	1.
21.	M.	30	3	2.	1.
22.	F.	30	3	22.50	0.50
23.	F.	30	4	2.25	1.75
24.	M.	32	3	2.	1.
25.	F.	32	5	3.50	1.50
26.	M.	32	5	2.50	2.50
27.	F.	32	4	3.	1.
28.	F.	33	3.50	1.25	2.25
29.	M.	33	3	2.	1.
30.	M.	35	4	1.75	2.25
31.	F.	36	4	1.50	2.50
32.	M.	37	4	2.75	1.25
33.	F.	37	3	2.75	0.25
34.	F.	38	4	2.	2.
35.	F.	40	3	2.50	0.50
36.	M.	45	2.50	2.50	Trace

Thus, in the first case, when the accommodation was relaxed there appeared a positive aberration of 0.25 D., the edge of the pupil being that amount more myopic than the center. When, however, the eyes were fixed on a point 8 inches from them, exerting 5 D. of accommodation, and giving the point of reversal for the center of the pupil at 8 inches, the edge of the pupil was found to have its point of reversal at about 10 inches, making it 1 D. less myopic than the center, negative aberration 1 D. The increase of refraction at the center had been 5 D., at the edge 3.75 D., and the difference 1.25 D., the deficiency of accom-

modation at the edge of the pupil was the change in abberration.

The size of the pupil varied in different cases, but in all it was the normal size of the pupil attending the given conditions of accommodation and convergence in the dark room. On this account these observations are of more practical importance than changes that might be noted in a pupil of fixed diameter; since the latter would vary greatly in significance for different eyes.

In all cases the increase of refraction was greater at the center of the pupil than at the margin; but the deficiency of accommodation at the margin varied widely. In case 36 it was a mere trace—less than one-quarter dioptre. In case 31 it was 2.50 D. or five-eighths of the whole 4 D. of accommodation exerted. In case 3 it was 3.25 D. The most striking fact brought out by the table is this wide variability in the deficiency. The same variability is shown in the smaller number of cases reported by Tscherning, in which the accommodation was measured subjectively by the method of Thomas Young.

But far more striking than anything that can be reduced to statistical form are the irregular and indescribable variations in the distribution of light and shadow in the pupil, that are found to attend accommodation. In the early days of the shadow-test Forbes[9] called attention to the variations in the shadows seen by it, and ten years ago[10] I pointed out that these variations were individual, and so numerous and peculiar to the particular eye that nothing except an understanding of the general optical principles which determined them could render them comprehensible. The changes in the forms of the light and shadow in the pupil produced by accommodation are equally varied. In brief, the changes in the refractive condition of the lens which are produced by accommodation are individual peculiarities which vary within very wide limits. These variations of light and shadow noticed with skiascopy are significant of defects in refraction that fall under the general head of irregular astigmia, with which it is generally the case that a certain amount of regular astigmia is found.

Grossman, studying the changes of eserin-accommodation in the eyes of the cat, found during accommodation a high degree of regular astigmia; corrected in this case by the narrowing of the slit-like pupil, as Lindsay Johnson found such astigmia corrected in the eyes of the seal. When, however, the accommodation was relaxed by atropine, a large part of this astigmia disappeared under the tension of the capsule. In these observations we have the

most definite and positive evidences of astigmic accommodation, and of changes in its amount and direction attending the accommodative changes which are equivalent to the effects of spherical lenses.

Let us turn to the structure of the crystalline lens and its bearing on accommodation in general for an explanation of these observations. The general course of the lens fibres is represented in Fig. 2. Each is a bent elastic body. Under tension of the zonule and capsule its ends are brought nearer together, like a bow when the string is drawn upon; and the lens, as a whole, is flattened and rendered thinner. When the tension of the zonule is relaxed the ends of each fibre tend to separate like the ends of a bow released from the tension of its string; and the lens as a whole becomes thicker. If all the fibres composing each concentric layer of the lens are of the same shape and structure, of equal

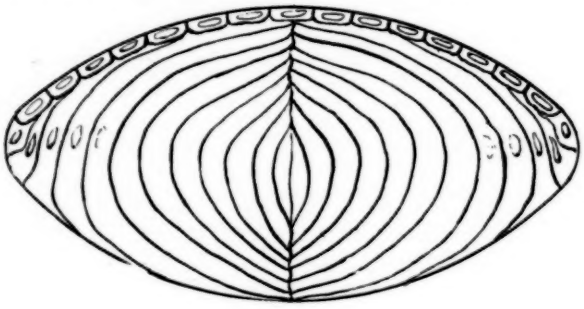

FIG. 2.

strength and elasticity; the changes in the shape of the lens, and the consequent changes in its refraction, will be symmetrical with reference to the axis of the lens. If the fibres differ in form or structure, are of unequal strength or elasticity, the changes in form or refractive power of the lens as a whole will be asymmetrical. Fig. 3 represents a model of the kind shown in Fig. 1, but having springs of unequal strength on the two sides.

Under tension it may become symmetrical, assuming the form indicated by the broken line. But released from tension it at once assumes an assymetrical form indicated by the solid lines; which form is dependent on its inherent structure. Such asymmetry irregularly distributed or confined to the adjoining fibres of one sector of the lens would cause irregular astigmia. But if confined to the fibres of two sectors opposed to one another, as compared to the fibres disposed at right angles to these, it would cause regular astigmia. Such an explanation of astigmic accom-

modation, or accommodative astigmia seems to me more simple and rational than the supposition of asymmetric changes produced in a lens of uniform elasticity by asymmetric tension of the zonule.

As I have observed changes in astigmia attending changes in accommodation, these are better explained by the mechanism here suggested, than by that of unequal tension of different parts of the zonule. However, the latter need not be regarded as impossible, although certain inherent difficulties may render it improbable. The ciliary muscle is composed of unstriated muscle cells. Continuous layers of such cells elsewhere, as in the intestinal canal may contract and relax in segments. But it is very uncertain whether such segmental activity ever arises from anything but immediate local stimulation. To suppose that in the ciliary

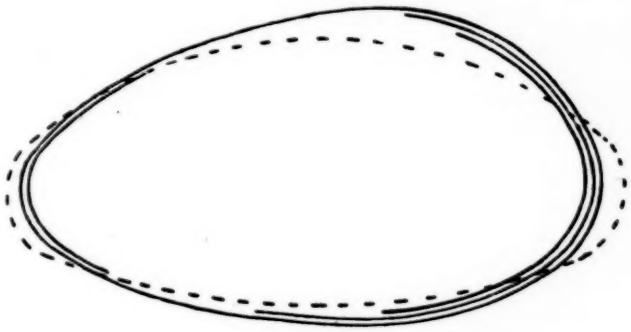

FIG. 3.

muscle it arises in response to so distant an impulse as a reflex to blurring of the retinal image, that it is directly compensatory for the defect of the individual eye, is a bold assumption. Although the ciliary muscle is generally described as consisting of two parts, one composed of radiating and the other of circular fibres, these two are intimately blended together. Fibres at first radial blend and become a part of the circular group; or they may be traced fairly from the circular into radiating fibres. The existence of circular fibres at all is a grave difficulty to the supposition of partial contraction of the ciliary muscle, except in response to absolutely local causes. It is difficult to conceive how in a continuous mass of unstriated fibres, placed end to end and intimately intermingled, one portion can contract, while a part continuous therewith remains relatively relaxed. I do not forget that asymmetric action is reported by Brandes[11] to have been produced by eserin, and partial paralysis by homatropin; but this was

by a strictly local action of the drug, something totally different from partial response to a central nerve impulse.

The supposition that accommodative changes in astigmia depend upon their peculiarities, gives a new interest to the arrangements of the lens fibres. Bowman[12] pointed out that the primitive arrangement observed in the lower animals seemed to be one in which all the fibres started from the antero-posterior axis of the lens and returned to that axis. An advance on this was the arrangement in which all the fibres started from one axial plane, in the anterior part of the lens, and meet in a second plane at right angles to the first, in the posterior half of the lens. In higher types of animals the arrangement becomes still more complex. What may be termed the planes of origin and insertion of the lens fibres become progressively more numerous, until in man they consist of radiating planes that branch repeatedly, giving an arrangement of fibres admirably adapted to overcome and neutralize the inequalities of individual cell development. Bowman wrote of these fibres more than fifty years ago, when he believed that the power of accommodation depended not on change in the shape of the lens, but upon its displacement forward by the contraction of the ciliary muscle. Yet with regard to this structure of the lens he used these words (page 67): "It certainly appears to me that the expansion of the axis into the planes now described, and the complexity of the arrangement of the fibrous constituents of the lens, are designed to furnish the mechanical means of modifying the curvature of the surface of the lens."

To recapitulate: 1. Accommodation and the optical changes coincident with it depend on the inherent elasticity and structure of the crystalline—its tendency to assume its individual shape when freed from the tension of its capsule.

2. Accoccodative changes in astigmia are mostly due to asymmetry in the strength, elasticity, or arrangement of the lens fibres; although it is possible that they sometimes arise from asymmetrical tension of the zonule.

If these explanations are correct, they have very practical bearings on the correction of ametropia. The correction of hyperopia, putting an end to accommodation for distant vision, should be accompanied by the accurate correction of the astigmia which exists with relaxed accommodation, and complete correction of astigmia may only be possible after complete relaxation of accommodation. In exceptional cases the best optical correction for the eyes may include a cylinder for near work different from that

acquired for distant vision. But this would only be very exceptionally for eyes using a large amount of accommodation; and the difficulty might often be best met by something of a compromise in the cylindric component of the correction.

REFERENCES.

[1]Porterfield. A Treatise on the Eye. Edinburgh, 1759.
[2]Cramer. Het accommodatie-vermogen. Haarlem, 1853.
[3]Helmholtz. Allgemeine Encyclopedie der Physik. G. Karsten. Part I, p. 112.
[4]Donders. Accommodation and Refraction of the Eye. London, 1864.
[5]Tscherning. Physiologic Optics. Translated by C. Weiland. Philadelphia, 1900.
[6]Priestley Smith. Ophthalmic Review, November, 1898, p. 341.
[7]Grossmann. Ophthalmic Review, January, 1904, p. 1, and December, 1904, p. 347.
[8]Thomas Young. Philosophical Transactions. London, 1801.
[9]Lytton Forbes. Royal London Ophthalmic Hospital Reports. 1880, p. 62.
[10]Jackson. Skiascopy and its Practical Application, p. 57.
[11]Brandes. Astigmic Accommodation From Homatropine and Eserine. Annals of Ophthalmology, October, 1903.
[12]Bowman on the Eye. London, 1849.

DISCUSSION.

Dr. Schneideman (Philadelphia): There is no doubt that the degree of the astigmatism, and even the axis changes, in some cases, as the eye alters its adaptation from its punctum remotum to its punctum proximum. This change has heretofore been generally ascribed to partial contraction of the ciliary muscle, leading to unsymmetrical changes in the lens. This explanation is now believed in many quarters to be incorrect. It is at least not proven. In Grossman's case of aniridia with polar cataract, certain unexpected movements of the lens were observed during accommodation, and these may have something to do with the phenomenon.

Writers upon the mechanism of accommodation consider the lens to be simply a semifluid body in an elastic capsule. In the mechanism of accommodation the elastic capsule is everything. No attention is paid to what Dr. Jackson points out, the structure of the lens itself with its arrangement of fibres. These of various strengths, shapes and positions, he compares to elastic springs, which, when released from tension, may well play an important part in the particular shape the lens is to assume during accommodation. The resultant of all these forces may account for the anterior lenticonus developed during accommodation, as well as for a certain amount of astigmic effect.

It is not likely that nature would go to the trouble of perfecting a complicated system of fibres, such as the lens consists of, if they had no function. And the function of the lens is, of course, that of accommodation.

Dr. Fridenberg (New York): I would call attention to an article by Grossman, of Liverpool. Dr. Lewis, in his paper, likened the accommodation to the rapidly moving river, the motion invisible until it meets some obstruction. Grossman reports a congenital lesion in the iris of both eyes, with a small spot on the anterior and posterior capsule. One could hardly imagine a better arrangement for the observation of accommodation than this, and it was carefully studied with the retinoscope and ophthalmometer. The conclusion was that there is an increase in the refractive power of the lens, and a decrease in diameter, the anterior surface moves forward and the posterior backward. The ring is narrowed and the ciliary processes appoach the visual axes of the eye. There is decided elasticity of the capsule. The whole lens trembled whenever the accommodation was exerted, and this showed there was no tension of the capsule, as claimed. He claims it is incorrect to draw conclusions from traction on an extracted lens. The experiment is too gross. We do not know in what direction we are exerting the force, and a difference of a few degrees in the angle of direction may produce different results. Another interesting point in Grossman's observations is regarding the accommodative change in astigmatism. He claims there is a side motion of the lens as a whole, and in this case he was able to see clearly the motion of the lens. Contrary to the general belief, there was trembling of the lens. He believes the change may be explained by this slight motion of the lens rather than by segmental contraction of the ciliary muscle.

Dr. Jackson (closing discussion): I think Grossman's work on his case has been the last thing needed to give us an understanding of the accommodation. It is certainly a valuable contribution to the literature of the subject. Bowman suggested the significance of the lens structure in his lectures published fifty-six years ago. I do not think that any one who is at all familiar with the phenomena of living beings can conceive of an elaborate structure without some function, and the optical function of the lens seems to be its sole function, and it seems fitted to do this particular thing. The gap seems very slight in what we now know of accommodation. I would like at this time to refer to Dr. Lewis's paper. I think we cannot too strongly emphasize

the connection between accommodation and the intraocular circulation. I think the explanation Dr. Lewis put forward the other day somewhat tentatively, we may not quite accept; but there is some intimate connection between the intraocular circulation in these large vascular spaces and the act of accommodation.

RELATIONS BETWEEN MEDICAL PRACTITIONERS AND SPECIALISTS IN DISEASES OF THE EYE.*

BY JAMES A. SPALDING, M. D.,

PORTLAND. ME.

(For sake of brevity, I shall in this paper, call medical practitioners, Physicians, specialists in diseases of the eye, Oculists.)

The composition of a paper on this important question would seem, at first glance, an easy task. The more, however, that it is studied, the more it abounds in difficulties asking loudly for a solution. All that we have to do, from one standpoint is to scold physicians for not immediately sending all of their patients with headache, or defective sight, or inflammations of the eye of any sort, to the oculists. We may also find serious fault with them for putting their names to petitions to the Legislatures, asking for laws to place uneducated opticians on a level, so far as eye examinations are concerned, with medical men who are as well educated as oculists are supposed to be. As the question is looked into deeper, we see chances for fault-finding on both sides. For, from another standpoint, if well educated oculists have the right to be seriously offended at the way in which they are neglected by many medical men in favor of opticians, there is another side to the story, to which your attention shall be called at once. In order that oculists may expect the support of physicians, generally, they must be decent, and ethical, and properly educated.

Many physicians, and people generally, have the right to complain of the way in which some oculists have behaved toward the profession, the public, and even their fellow oculists; by demanding too frequent visits; by asking too large fees; by taking away patients and families from the practices of physicians; by acting like charlatans, and by sneering at the operative skill and refraction work of other men in the same line. How, for instance, can any physician recommend a patient to an oculist who will insist

---

*** Read at the tenth annual meeting of the American Academy of Ophthalmology and Oto-Laryngology, Buffalo, Sept. 14th to 16th, 1905.**

on daily visits for one year, under pretense of absorbing cataracts by instilling a lotion into the eyes, when that lotion, if of any use, could as well be instilled at home and an occasional visit for observation made? What can one's opinion be of an oculist who will invite into his place of practice, where good specialists abound, another man to operate on patients for pay during that foreigner's "vacation?" What can we think of the man who will accept such an invitation, when in so practising, he is actually taking from a tax-paying citizen fees that should be his? I am opposed to any inter-state licensure that goes beyond a consultation for the day and the hour and the operation, or a permanent change of States.

What opinion can any medical man have of an oculist who says in the hearing of a patient: "There, I don't see why he" meaning another oculist, "did not operate at once?" Yet everybody knows that some cases do better by no operation; and that others are made a great deal worse.

Or what can the physician think of an oculist who sneers at a brother oculist's lens-prescription, when he has known the axis of astigmatism in his own eyes to alter in a single night of hard work in an obstetric case?

Can any physician recommend to his patients as a safe man in diseases of the eyes one who, like the $5-a-month-correspondence-method-quack tells a patient to drop into the eyes eighteen times daily, lotions from six different bottles, all containing the same indifferent solution? Or can he think well of that oculist who, on the plea of nasal obstruction as the cause of lachrymation, compels a patient to make daily visits for six months for use of a spray, when if of any use, that spray could be produced at home, part of the time? Would any physician like to be treated in such ways himself? What must we think of any oculist who permits an optician of today to advertise: "That he studied how to fit *lenses* for two years in the office of the eminent eye doctor of such and such a city!" Finally, would any physician recommend to his patients oculists of apparently good standing who advertise in the papers that "they take this method of informing the profession that they are making a specialty of the eye," when it is so easy to see that if they wished the profession *only* to know this fact, they could send out personal notices?

Asserting, now, that if oculists desire the support of physicians they must be ethical and decent men, I can proceed with a clear mind and argue in favor of well educated oculists who

treat their fellows and the public honestly. For this is a burning question of today asking for decision. All around are oculists educated to do good work, yet deprived of patients by uneducated opticians. What is the cause, and is there any remedy? If we can solve these questions we can make it worth while for men to study the eye. If not, then the specialty as a means of making a living may as well cease; patients visiting the opticians for lenses, and the hospitals for operations. The man who expects to live in competition with these two antagonists must have his private hospital, with his own grinder of lenses.

The most important fault to find in the relations between physicians and oculists is the neglect, thoughtlessness, greed, inattention—call it what you will—by which any physician meeting with any inflammation of the eye fails to advise a consultation with an oculist. No one ignorant of the anatomy and diseases of the eyes has any right, in the neighborhood of skilled oculists, to have anything more to do with diseases of that organ, than an oculist has to treat a fracture or a fever. In each such separate instance, each man is ignorant. The proper physician should be summoned or the patient sent. This standpoint is so impregnable that it would seem useless to mention, yet but lately have I seen an eye lost from glaucoma because the physician did nothing. He said the eye would improve as the patient's health improved. Lately, again, I have seen a patient with iritis whom, the physician failing to help, was sent by him to an optician to see if lenses would not cure. Finally, it is a recent fact in my practice of removing from the corneae of three different patients, foreign bodies, for the removal of which these patients were recommended to an optician by a physician. Many are the attacks of iritis in which astringents have been used by physicians instead of atropia, with the resulting adhesions and diminution of sight. Rarely have I had cases of ophthalmia neonatorum referred to me by physicians until they were serious. How many physicians insist on treating eye diseases of which they know nothing, except as they study up in the text books? How many fit lenses imperfectly, without ever intending to do that delicate work perfectly? But let me leave this section. There are exceptions which test the rule. Still, I have no patience with men who are half one thing and half another, except in towns where there are no oculists. There, they have their place, and should be encouraged to do *good* work.

No oculist that I ever heard of ever recommended any sick

person to consult a druggist. Yet many physicians do this absurd thing when they send people with diseased or inflamed eyes to opticians!

What, now, is an optician?

A person who, seeing a chance to make a good living by the exercise of some ingenuity and the power of advertising "Eyes Tested Free," studies, after a fashion, at an optical institute, or often by the correspondence school method. In some schools he can get a diploma to test eyes after *talking two hours with the proprietor.* In others there is a course of from two weeks to six at the most. In these institutions instruction is of the most meagre form. Practical eyesight testing is slight. The use of the ophthalmometer is taught, but the pupils are always told to follow the axis so shown, when it is a fact that patients often accept a cylinder with an axis exactly opposite. Of the eye muscles and ophthalmoscope nothing is taught. With this slight outfit, without any knowledge of the anatomy of the eye, or the tests for colors, visual field, muscular imbalance, and so on, a man so taught becomes an optician, and enters into competition with men educated in diseases of the eyes. Present conditions point to the success of such men as likely to be permanent, owing to many reasons, but chiefly, as I believe, to the failure of physicians, as a whole, to advise at every opportunity the people to consult an oculist in preference to opticians.

What is an oculist?

I take it that a physician specializing in the eye, in order to deserve the patronage of the people and physicians, ought, as I have previously said, to be above reproach. He ought to have studied medicine for four years, to have had chances for clinical work in a hospital, and then have studied the eye thoroughly. I have always blamed, and I mean to blame to the end of my life, every oculist who signs his name to a six weeks' certificate of special study of the eyes. I can find some fault with those who sign certificates of three months' study. It would be better for every oculist to study an entire year, and to have had under his personal care, in an eye-hospital, at least one thousand patients before beginning practice. Every oculist must see that if he wants to deserve support he must be well educated. How can he possibly compete with opticians unless he makes it plain to the public that he has studied more than they.

If you recall the hundreds of diseases of the eye it is plain that you cannot learn much about them in six weeks, to say noth-

ing of learning how to test the sight besides, so as to do it better, *better,* I insist, than the opticians. They have but six weeks, at the most, in which to do this, yet many practicing oculists of today are willing to put their names to certificates asserting that in that short time a graduate in medicine can learn all about the eye and its diseases, besides learning how to test the eyesight as well as the opticians have done in the same brief time. Do you see the dilemma? If you do, then I say that this Association to which I am talking should speak in no uncertain terms, for the future, against any of its members signing similar deceptive certificates of insufficient instruction.

The eye is a part of the body, yet the testing of its functions has left the hands in which it belonged, namely those of educated medical men, and been granted by a vast majority of the people to those who know nothing about it. For, to test the central sight, alone, and so to decide about the condition of the eye, is as outrageously ridiculous as to feel the pulse and assert that the heart is normal, or to see a person pass a good full stream of water, and say that the kidneys are healthy. Yet no living person would seriously defend the diagnosis of cardiac or renal diseases from observations so nonsensical as these.

In the same line of thought, the eye contains in its function of sight many indications of the condition of the body totally ignored by opticians. With the ophthalmoscope we can diagnosticate many constitutional diseases. By the color sense we recognize more than black and white. By alterations in this sense we diagnosticate diseases of the retina and optic nerve. With the aid of the field of vision, we see not only straight ahead, but laterally, and so anticipate approaching danger. The measurement of the visual field warns us of optic nerve disease, or glaucoma, or of cerebral affections. The size of the pupils warns us of tabes. Finally, the condition of the eye muscles is most important. Few pairs of muscles are balanced, and there is no greater medical triumph than by the use of a minute prism to correct hyperphoria, and relieve a patient from innumerable troublesome nervous symptoms.

The term, eye sight, means, I repeat, a great deal of which most people are absolutely ignorant, the opticians as much so as the laity. I insist upon it, that the testing of the *entire* function of the eye, the central sight, the color sense, the field, the pupils, and the examination of the fundus of the eye is a medical study and a medical act. Any organ of the body which fails to perform

the function for which it was created, is a diseased organ, and should be treated only by medical men. Any eye that has vision below normal, is a diseased eye, and should not only be examined and tested by medical men alone, but should, finally, be treated by them if they see fit, with proper lenses.

If people wish to be fools and to consult uneducated men we cannot help it. But it is a far-cry, from voluntarily consulting an optician, and the being directed to go to see one by any physician.

The test of the sight being, as I insist, a medical act, we cannot help wondering how it has fallen so largely into the hands of opticians, who, at their very best, are incapable, being uneducated, of properly deciding points of so immense importance to every person living. And here, I cannot help observing, how curious it is, that people will pay so largely for teeth to enable them to look passably well at an age when looks are of no concern, or greedily to swallow burdensome abominable boluses of meat, and yet begrudge the fee for the oculist who can tell them what is worth a thousand teeth.

I recollect as if it were yesterday, how, years ago, a physician complained to me of his difficulties in getting a living by medicine, and how, in order to increase his income, he examined pathological specimens and made urinalyses. He said: "I ask a small fee, but I cannot get physicians to give me the slightest help. They say they can get it done for less. But you know that the man who asks these minimum fees is not an educated man, and that his quantitative analyses are guess work."

This was twenty years ago, but the same bargaining spirit, the same jealousy, the same belittlement of special medical work by some of the profession, the same dread of losing a patient by sending him to a consultation, all exist to this day. And, to cap the climax, that same complaining physician at last slowly prosperous, now consults an optician and sends to prolonged medical struggles another medical man, the oculist, as he himself was sent by those of his own time.

Another important cause of the rise of the optician to the title even of "Doctor," is the belittlement of the medical profession as a whole by many people of today.

Granted that surgeons are on the top today, owing to the prestige of surgery, and that as surgeons they have nothing to fear in popular estimation, I urge that medical practitioners have less influence, in inducing their patients to consult the oculist than of old, and that the oculists also live under this blighting in-

fluence. Many people use ancient prescriptions, many rely on patent medicines, others on counter-prescribing, and many have abandoned medicine altogether for various forms of nonsense. Together with this tendency, many men have rushed into the practice of medicine who would, on their own confession, be better clerks and market gardeners. People act more irritably toward their medical friends than of old. Sooner do they forget their wonderful successes.

So far as the oculists are concerned, people, and physicians, too, complain of the large examining fee. They cannot see why anybody should get so much money for so little work. They forget that what the fee represents is great, for upon a conscientious examination of the eyes depends not only the enjoyment of sight, but of health.

To this belittlement of the profession, as a whole, has been added that dreadful jealousy of other men. Physicians hate to have it said that they ought to have sent that headache patient to an oculist, months ago, for a proper eye test. In order to avoid this, some of them pander to the opticians. The physician and the optician both failing, say that they have *"done their best,"* when an educated oculist would, in all human probability, have solved the problem. Some physicians refuse to believe that headaches can come from eye strain. Some oculists still laugh at the muscle fad, in which there surely are some good grains of solid truth.

Just as people belittle physicians, and are jealous of the money that they are supposed to make, so some physicians belittle the testing of the sight, let patients go to optical shops, and even go there themselves.

Physicians, again, have a way of diminishing the practice of their fellow doctors, the oculists, by sending minor operations, like chalazion, squint, and foreign-body removals to hospitals, instead of oculists' offices.

The practice of medicine is full of curious contradictions. A physician puts some urine into a machine and sets it revolving. In a minute it is done. With reagents in another minute something more is done. Waiting a while for a sediment to form, the microscope is employed. Now *that* is something great, because from those tests the physician has made a diagnosis of the condition of the kidneys. So, too, are a few taps on the thorax to diagnosticate a pleural effusion, or the brief listening to the heart to detect a murmur! Apparently, these acts are trifles. If you say so, you are reproved for belittlement of the physician and his art.

If, however, an oculist takes more than a few minutes to test the sight and to use the ophthalmoscope, and, generally, to make a careful diagnosis of the eyes, it is *nothing*. *"Any child can test the eyesight."* Those who say this forget that it is the putting of all the tests together which makes an examination worth having. Under the belittlement idea, it is a mere nothing, calling for no more than what is advertised as "Eyesight Tested Free." "Why don't you ask your optician if there is anything the matter with your eyes," just as if he knew, anyway. How can he know, knowing nothing, except what the patient tells him that he can see right straight ahead.

Some physicians recommend people to opticians because the optician and his family are patients. Here, it is difficult to avoid offense, but the optician need not know that the physician has sent a patient to an oculist, unless he chooses to open his mouth. Expectant favors, are, however, repaid at a dear price, for the less a physician has to do with exchanging bills with his patients, the better off is his purse.

I have heard of patients being sent by medical men to opticians simply because their favorite oculist was out of town. Rather than let their friend later on discover that a second oculist has been recommended, they soothe their conscience by suggesting an optician.

Many a time the opticians have gone before State Legislatures with the signatures of medical men appended to petitions to enable them to receive official endorsement that they can test eyes as well as educated oculists. But what a slur on their own practice. For, if uneducated men can prescribe lenses for diseased eyes, as well as educated oculists, why on earth cannot uneducated quacks prescribe for diseases of every part of the human body just as well as can educated physicians? However, it is only the strong-minded man who can say "No" and stick to it. Where one says "No," a thousand sign, pass on, and forget what they have done, or the meaning of their deed.

Many people consult opticians simply for the purpose of looking over their stock in trade; they want to pick out a frame, lens, grip, or chain to suit themselves. The opticians permit the wearing of eyeglasses where spectacles are the only thing advisable. It is a good deal like the bargain days. Possibly, *free* testing comes into play, the visitor forgetting that he has to pay in other ways.

Just as physicians should not hire a correspondence-school nurse, so should they not advise patients to consult opticians. Just

so little as a physician would like to see his own son educated for four years of college, and four of medicine, and a year of special study on the eye, then driven to the wall by competition with uneducated opticians, so little should he drive the sons of other men in similar competition.

Having spoken at too great length, perhaps, of existing conditions, let me offer some remedies.

Eye sight testing is a medical act, and should be done only by medical men. This is difficult to prove, even to physicians, some of whom, as we know, will not believe it. But we must insist upon it all the more, and preach it at every opportunity. A chemist can analyze the urine, but he cannot apply what he has learned to the cure of a disease of which he knows nothing. An optician can tell that the sight is not normal, but he cannot possibly tell whether that subnormal sight is due to diseased refractive conditions of the eyes or to inflammatory diseases of a deeper-seated nature. In giving the best lenses that he can find, he has only half completed his duty and has left the patient in a condition which may lead to permanent disturbances of sight. If people wish to trifle with their sight, we cannot prevent them. But we must teach everywhere, that if the heart is failing in its duty, it is to the physician to give advice; if the lungs are diseased, consult the physician. If the eye sight is not perfect, consult the physician who understands what the defect it. Make it plain, that any eye which cannot see the standard letters at the standard distance, is a diseased eye, and needs the examination of a physician-oculist.

It is a modern tendency to try to get rid of middle men, and as such, oculists in cities of moderate size are regarded, in so far as they test eyes, and then foolishly send the patient with a prescription to an optician.

To furnish our own lenses would seem to be a powerful antidote to the optician disease.

If people could know that they could get examination, lenses, and all, at an oculist's, they would recognize him less as a middle man. For what attracts people more, even to the opticians, than the free eye-test, is the chance to pick from a good stock in trade, something looking nice and fitting well on the nose. Many a case have we lost, with which we could have bargained had we something to show. Do you blame me for this suggestion? Do not forget that even the doctors give remedies in more pleasant forms than of old. Let me suggest, then, to the younger men, to lay in

a stock. Let me urge you to visit an optician and learn the tricks of his trade, such as the making of repairs, the bending of springs and frames, the adjustment (so-called) of lenses. Opticians have invaded our field, why may we not protect ourselves? I have not for years sent a patient with a prescription to any optician. Every pair of lenses has come from the grinder to me; I deliver them to the patient. For repairs, the lenses come to me and after the optician has done his work the lenses go back to the owner, from me. In this way I have held on to some patients for as many as twenty years.

We could in this same way hold on to our medical friends, personally, by having a choice stock of goods from which they could pick. Holding them personally, they would think of us oftener whenever they had occasion to suggest an examination of the eye. Do not call this suggestion meretricious. It is merely an appeal to the human side of things, as in every trade or profession.

A remedy for the differences between all physicians is organization. If organized, physicians could do great things. There would be less jealousy. Why is it that we can admire an operator who does beautiful work in some other place, yet talk half-heartedly about him if he lives in our own town? If organized, all physicians would *tend* to support one another. Lawyers are human and have the same feelings, as men, as we have. Yet being organized, they maintain a high standard of integrity toward one another. As they have made the law to belong to lawyers, we should band together to make, as far as possible, medicine belong to medical men. If, as an organization, we frowned on patent medicines, our influence would be felt. If, as an organization, we frowned on improper fitting of lenses by uneducated men, that, too, would have weight with the public. The mere assertion in the papers that an organization of physicians was opposing certain measures would call the attention of people to such measures, concerning which they may never have thought. If medical men made an organized opposition to ignorance of every sort, they would gain a victory now and then, despite the strength of superstition. Many physicians are afraid to join a society. They think that the other man will get ahead of them, in some unknown way. They fear a trap. What is the result? Quackery triumphant. Of this there is no more brazen exhibit than on the part of opticians who sell smoked lenses worth a few cents for $7, or gold-filled spectacles worth $1 for $5, or *radium* lenses (plain smoke glass)

worth a song, for such price as $55. I mention also glaucomatous eyes going blind while waiting, as the opticians tell the poor sufferers, "for the cataract to get *ripe*."

English medicine has lately shown what organization will do. A vaccinator, believing that his grant was inadequate, asked for an increase. This was refused and his resignation demanded. It was given, and the vaccinator informed the members of his medical branch of his reasons for resigning. When the authorities advertised for a new vaccinator at the old rates, no one applied, and they were obliged to reinstate the former holder at the terms asked for.

Organize! Join with other medical men. Outside you are narrow, selfish, jealous. Do not forget that every medical man has just as much right to live as you have, and that the more you help him, when you possibly can, the more you honor yourself. There is not a single physician anywhere from whom you cannot learn something useful. The greatest minds of all ages acknowledge with cheerfulness and humility that even from the humblest of men they have learned something to their benefit.

Even the opticians have organized to fight for what they are pleased to call their rights. They forget it is true that they are taking away ours, given by our license to practice medicine. If they wish to be licensed, let them be examined by medical men. Any man can plane a bit of wood. It is the educated man in that line who can plane it best. What we ask of physicians is that just as we know that every patient of theirs will get the best medical advice that education can give, so we look to every patient of ours getting the best that study of the eye can give. Let physicians send to the oculist every case of eye disease that they see, and amongst these first, last, and always: I recognize an eye with defective sight.

Every State should have its association of oculists which should send to all physicians a fee table, to be shown, on occasion, to patients whose means are moderate. This table could show a reasonable fee for the examination, the glasses to be sold at cost. If people knew that lenses for which their friends had paid the optician $5 were worth but $2, they would see that for the *free test* they had paid $3. If they saw that for a fee of from $3 to $5 to a doctor, the lenses to be from $1 to $3 more for the very best, they would prefer to pay the best man. It is our $5 fee which keeps the opticians alive. For people think that besides this fee to the doctor, there is another $5 to the optician, and $10 is a good deal of money for people in moderate circumstances. So, many fall

into the trap. The proposed fee table could go farther, and authorize physicians at a distance from city oculists to guarantee a fixed price for examination and lenses included, asking, for instance, a minimum of $5 and a maximum of $10.

This seems a possible means of reaching the great middle class, who hate dispensaries and hospitals, and free treatment, but who, with their moderate incomes, are unable to pay large fees to the oculist and then the same old price to the opticians.

What would the opticians do if this plan were carried out? I reply that they would find plenty to do in grinding lenses, in making repairs, and in fitting simply presbyopic eyes with lenses, as patients grew older. For it would never do to compel people legally to consult, for a fee, an oculist, every time that they wished for a slight change as they grew older. Such limitations we must make, although urging necessary visits for the eyes at any time as much as for the teeth.

Hold to high ideals, and make the people rise to those. The great difficulty lies in finding the way in which to spread before them the suggestions contained in this paper, as well as in many others read before meetings like ours, and then printed where people never see them. *Associations* of medical men of all sorts should choose a publication committee who should make arrangements to print in the papers of today appropriate medical articles as the opinions of a respectable and educated body of men. This would go farther toward public education than to send reprints amongst medical men alone. Advertising thus themselves as a body of medical men, the names of the writers need not appear, any more than there is a signature to newspaper editorials. Personally, I advocate in this war against the uneducated fitters of lenses the public advertisement in prominent newspapers of the EXISTENCE of an association of oculists; of medical men who devote their attention to the eye, who urge that people with weak or defective sight should consult medical men as best and cheapest in the end.

I am in favor of every association of oculists issuing its own test type card, with its name and purposes set forth, front or back. This card is to be handed to every physician in the State to use in his office, and to have in sight as a regular reminder of the existence of this association and its members. It might be advantageous to print on the backs of those cards to be sent to physicians the fee-table-suggestions mentioned before.

Association members should be sent to schools and colleges to test the sight and eyes in every way, and to follow such testings for the four years of school and college life. Keep in touch with the public, with published accounts of what you are doing in this line of actual education.

During my thirty years of practice, I have met many school teachers, and I have always found them open to argument regarding the need of most careful testing of the eye sight. Many have in times past asked me to send them a test card, so that they could *seat* their pupils according to their sight in the schools. Thinking over, then, in the composition of this paper, the encouragement offered by teachers past and present in Maine, I would have association test type or test cards sent to teachers throughout the State, to be hanged in the schools.

Fellow members, this topic is as broad as the ocean, and I am simply contributing my little drops of thought to its solution. Let me offer now a *resume.*

Many medical men help opticians when they ought to help their fellow practitioners in eye-medicine. The reasons are thoughtlessness, ignorance of the need of deep study of the eye to fit lenses properly, complaints of the cost, fear of losing families to half specialists and half medical men, belittlement and jealousy. Remedies suggested are recognition by physicians that the eye is an integral part of the body and should be tested medically; that an eye which does not see perfectly is a diseased eye and needs medical testing. These doctrines physicians should teach and uphold. Oculists should be well educated, ethical, honest men, free from jealousy and well equipped to enter into the changed aspects of modern life by which opticians have obtained, through advertising, an extensive hold on a portion of the domain of medicine to which they have not the slightest right, because of their total lack of medical education. To meet these conditions we must prove to people that we know more than they do, we must carry goods as they do, we must hold on to our own prescriptions and repairs. We must learn their trade so far as that is compatible with medicine.

Speak as fairly of your competitors as you can, and they will be likely to treat you in the same way. No one can be perfect, so why find fault with what others have done by mistake—perhaps they were rushed with work, perhaps they were tired. Everybody makes mistakes and will continue to make them. If your fellow practitioners joke you about your big fee, just pass

along to them how many small fees they make to your single one. If they drop the hint that you ought to change lenses for nothing, just give them the little reminder that their patients pay for the second, or even the third bottle, made from the original prescription.

Organization is imperative, for when we pay to defend our rights, as we do pay in keeping up an association, we touch our pockets, the source of our means of living. Once organized, we can fight better, and so enjoy our share of public patronage. Don't run down the opticians. Don't make martyrs of them. Simply assert our claims. Say nothing against theirs. A certain class of people will always consult opticians because their incomes are small; many will consult them rather than have anything to do with a doctor. It is quite certain, however, that by following some of the suggestions made by numerous writers on this vexatious topic we shall obtain many new patients which we have lost hitherto by keeping what we know about the eye, and its functions, and its relations to the body, altogether too much to ourselves.